

Gpx2 Cas9-CKO Strategy

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Overview

Target Gene Name

- Gpx2

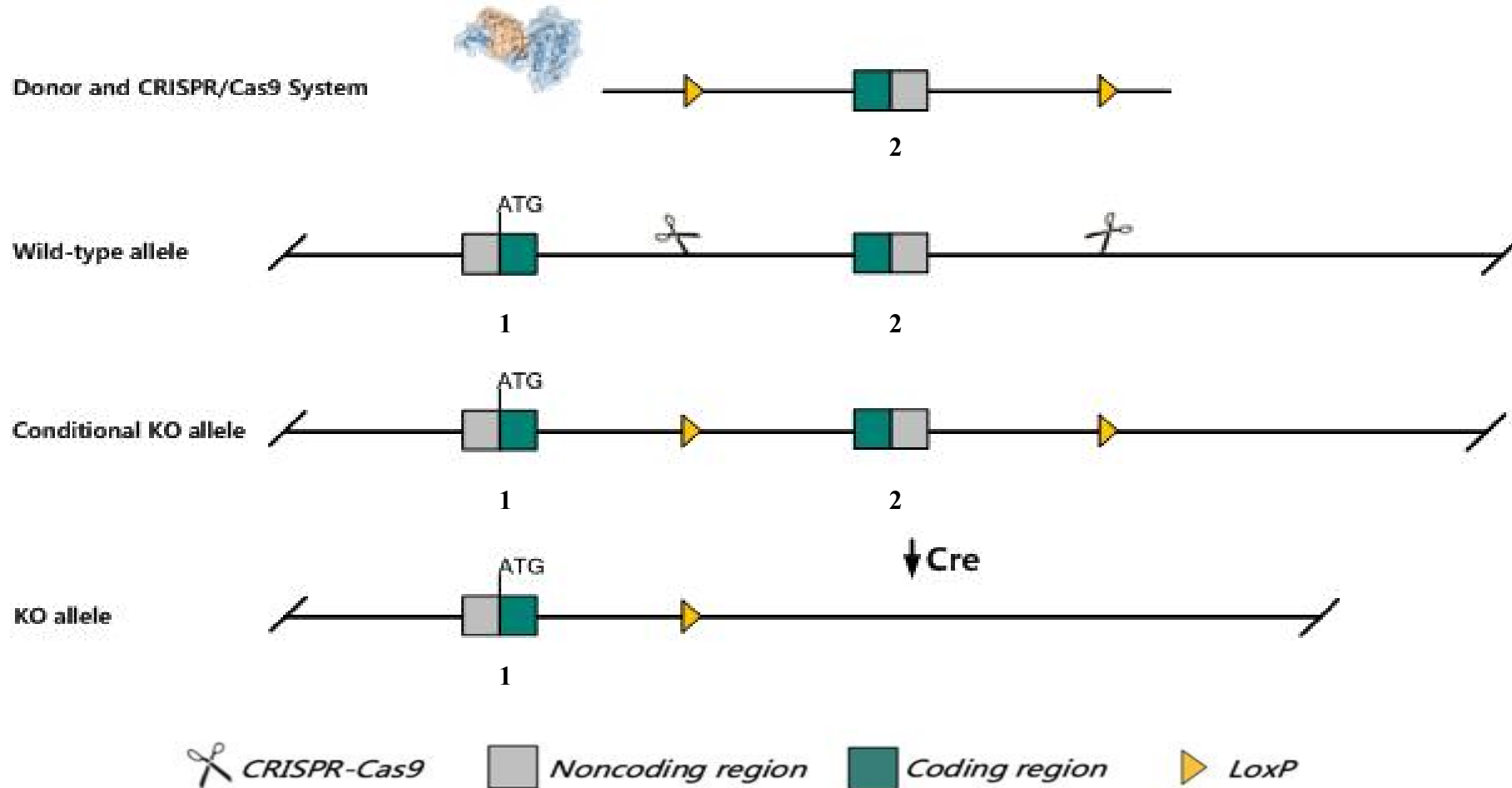
Project Type

- Cas9-CKO

Genetic Background

- C57BL/6JGpt

Strain Strategy



Schematic representation of CRISPR-Cas9 engineering used to edit the *Gpx2* gene.

Technical Information

- The *Gpx2* gene has 2 transcripts. According to the structure of *Gpx2* gene, exon2 of *Gpx2*-201 (ENSMUST00000082431.6) transcript is recommended as the knockout region. The region contains part of coding sequence. Knocking out the region will result in disruption of protein function.
- In this project we use CRISPR-Cas9 technology to modify *Gpx2* gene. The brief process is as follows: CRISPR-Cas9 system and Donor were microinjected into the fertilized eggs of C57BL/6JGpt mice. Fertilized eggs were transplanted to obtain positive F0 mice which were confirmed by PCR and on-target amplicon sequencing. A stable F1-generation mouse strain was obtained by mating positive F0-generation mice with C57BL/6JGpt mice and confirmation of the desired mutant allele was carried out by PCR and on-target amplicon sequencing.
- The flox mice will be knocked out after mating with mice expressing Cre recombinase, resulting in the loss of function of the target gene in specific tissues and cell types.

Gene Information

Gpx2 glutathione peroxidase 2 [Mus musculus (house mouse)]

Gene ID: 14776, updated on 13-Mar-2020

Summary

Official Symbol	Gpx2 provided by MGI
Official Full Name	glutathione peroxidase 2 provided by MGI
Primary source	MGI:MGI:106609
See related	Ensembl:ENSMUSG00000042808
Gene type	protein coding
RefSeq status	REVIEWED
Organism	Mus musculus
Lineage	Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Muridae; Murinae; Mus; Mus
Also known as	GI-GPx, GPx-GI, GSHPx-2, GSHPx-GI
Summary	The protein encoded by this gene belongs to the glutathione peroxidase family, members of which catalyze the reduction of organic hydroperoxides and hydrogen peroxide (H2O2) by glutathione, and thereby protect cells against oxidative damage. Several isozymes of this gene family exist in vertebrates, which vary in cellular location and substrate specificity. This isozyme is predominantly expressed in the gastrointestinal tract in rodents, is localized in the cytoplasm, and whose preferred substrate is hydrogen peroxide. Knockout studies in mice lacking this gene suggest a role for this isozyme in intestinal inflammation and colon cancer development. This isozyme is also a selenoprotein, containing the rare amino acid selenocysteine (Sec) at its active site. Sec is encoded by the UGA codon, which normally signals translation termination. The 3' UTRs of selenoprotein mRNAs contain a conserved stem-loop structure, designated the Sec insertion sequence (SECIS) element, that is necessary for the recognition of UGA as a Sec codon, rather than as a stop signal. A pseudogene of this locus has been identified on chromosome 7. [provided by RefSeq, Aug 2017]
Expression	Biased expression in large intestine adult (RPKM 1086.3), small intestine adult (RPKM 241.0) and 3 other tissues See more
Orthologs	human all

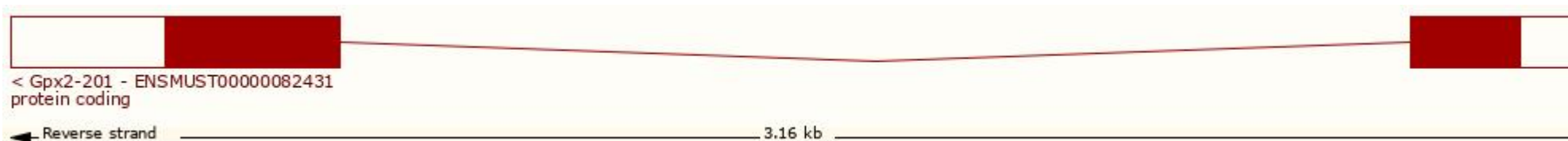
Source: <https://www.ncbi.nlm.nih.gov/>

Transcript Information

The gene has 2 transcripts, all transcripts are shown below:

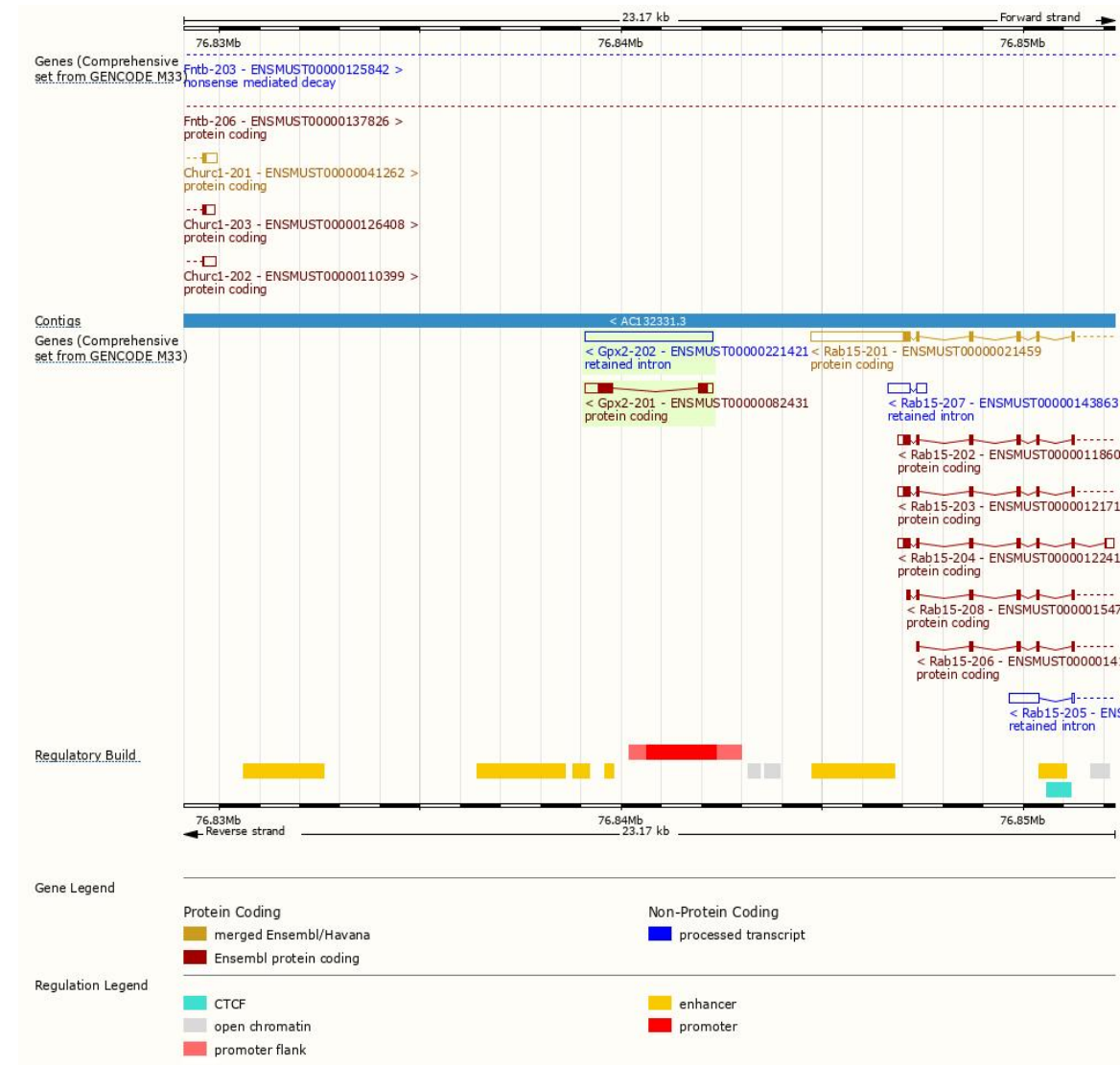
Transcript ID	Name	bp	Protein	Biotype	CCDS	UniProt Match	Flags
ENSMUST00000082431.6	Gpx2-201	1010	190aa	Protein coding	CCDS25996	A0A0R4J111	Ensembl Canonical GENCODE basic APPRIS P1 TSL:1
ENSMUST00000221421.2	Gpx2-202	3165	No protein	Retained intron		-	TSL:NA

The strategy is based on the design of *Gpx2*-201 transcript, the transcription is shown below:

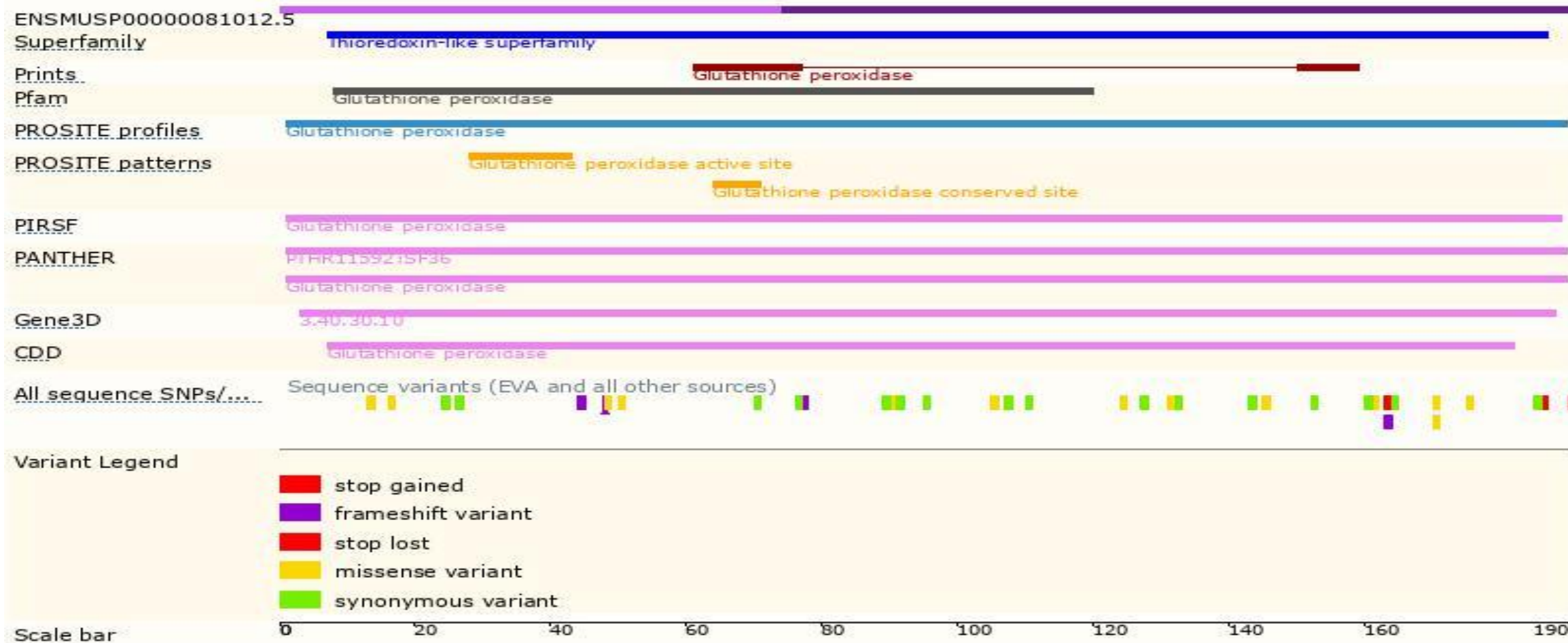


Source: <https://www.ensembl.org>

Genomic Information



Protein Information



Mouse Phenotype Information (MGI)

- Homozygotes for a targeted null allele appear normal, but double knockouts of Gpx1 and Gpx2 exhibit symptoms of inflammatory bowel disease, including perianal ulceration, growth retardation, and hypothermia, a condition that is sometimes fatal not observed in either single knockout.

Important Information

- According to the existing MGI data, homozygotes for a targeted null allele appear normal, but double knockouts of *Gpx1* and *Gpx2* exhibit symptoms of inflammatory bowel disease, including perianal ulceration, growth retardation, and hypothermia, a condition that is sometimes fatal not observed in either single knockout.
- *Fntb* gene may be destroyed directly.
- *Gpx2-202* may be destroyed directly.
- There are several amino acids of *Gpx2* gene will be remained, the effect is unknown.
- *Gpx2* is located on Chr12. If the knockout mice are crossed with other mouse strains to obtain double homozygous mutant offspring, please avoid the situation that the second gene is on the same chromosome.
- This Strategy is designed based on genetic information in existing databases. Due to the complexity of biological processes, all risk of loxp insertion on gene transcription, RNA splicing and protein translation cannot be predicted at the existing technology level.